

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grade 12	1. Use models and algebraic formulas to represent and analyze sequences and series. Explicit formulas for n th terms	4.3.12 A.1.1
	Grade 12	1. Use models and algebraic formulas to represent and analyze sequences and series. Sums of finite arithmetic series	4.3.12 A.1.2
	Grade 12	1. Use models and algebraic formulas to represent and analyze sequences and series. Sums of finite and infinite geometric series	4.3.12 A.1.3
	Grade 12	2. Develop an informal notion of limit.	4.3.12 A.2
	Grade 12	3. Use inductive reasoning to form generalizations.	4.3.12 A.3
	Grade 12	1. Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.	4.3.12 B.1
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Slope of a line	4.3.12 B.2.1
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Domain and range	4.3.12 B.2.2
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Intercepts	4.3.12 B.2.3

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Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Continuity	4.3.12 B.2.4
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Maximum/minimum	4.3.12 B.2.5
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Estimating roots of equations	4.3.12 B.2.6
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Solutions of systems of equations	4.3.12 B.2.7
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Solutions of systems of linear inequalities using graphing techniques	4.3.12 B.2.8
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Rates of change	4.3.12 B.2.9
	Grade 12	3. Understand and perform transformations on commonly-used functions. Translations, reflections, dilations	4.3.12 B.3.1

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Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grade 12	3. Understand and perform transformations on commonly-used functions. Effects on linear and quadratic graphs of parameter changes in equations	4.3.12 B.3.2
	Grade 12	3. Understand and perform transformations on commonly-used functions. Using graphing calculators or computers for more complex functions	4.3.12 B.3.3
	Grade 12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Linear vs. non-linear	4.3.12 B.4.1
	Grade 12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Symmetry	4.3.12 B.4.2
	Grade 12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Increasing/decreasing on an interval	4.3.12 B.4.3
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Linear, quadratic, exponential, periodic (sine and cosine), and step functions (e.g., price of mailing a first-class letter over the past 200 years)	4.3.12 C.1.1
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Direct and inverse variation	4.3.12 C.1.2

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Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Absolute value	4.3.12 C.1.3
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Expressions, equations and inequalities	4.3.12 C.1.4
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Same function can model variety of phenomena	4.3.12 C.1.5
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Growth/decay and change in the natural world	4.3.12 C.1.6
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Applications in mathematics, biology, and economics (including compound interest)	4.3.12 C.1.7
	Grade 12	2. Analyze and describe how a change in an independent variable leads to change in a dependent one.	4.3.12 C.2
	Grade 12	3. Convert recursive formulas to linear or exponential functions (e.g., Tower of Hanoi and doubling).	4.3.12 C.3
	Grade 12	1. Evaluate and simplify expressions. Add and subtract polynomials	4.3.12 D.1.1

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	Course/ Level	Standard	Standard ID
Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grade 12	1. Evaluate and simplify expressions. Multiply a polynomial by a monomial or binomial	4.3.12 D.1.2
	Grade 12	1. Evaluate and simplify expressions. Divide a polynomial by a monomial	4.3.12 D.1.3
	Grade 12	1. Evaluate and simplify expressions. Perform simple operations with rational expressions	4.3.12 D.1.4
	Grade 12	1. Evaluate and simplify expressions. Evaluate polynomial and rational expressions	4.3.12 D.1.5
	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. Linear equations and inequalities - algebraically	4.3.12 D.2.1
	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. Quadratic equations - factoring (including trinomials when the coefficient of x^2 is 1) and using the quadratic formula	4.3.12 D.2.2
	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. Literal equations	4.3.12 D.2.3

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Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. All types of equations and inequalities using graphing, computer, and graphing calculator techniques	4.3.12 D.2.4
	Grade 12	3. Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.	4.3.12 D.3
Communication Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Grade 12	1. Extend understanding of the number system to all real numbers.	4.1.12 A.1
	Grade 12	1. Extend understanding and use of operations to real numbers and algebraic procedures.	4.1.12 B.1
	Grade 12	3. Design a statistical experiment, conduct the experiment, and interpret and communicate the outcome.	4.4.12 A.3
	Grade 12	6. Distinguish between randomized experiments and observational studies.	4.4.12 A.6
	Grade 12	1. Use communication to organize and clarify their mathematical thinking. Reading and writing	4.5 B.1.1
	Grade 12	1. Use communication to organize and clarify their mathematical thinking. Discussion, listening, and questioning	4.5 B.1.2
	Grade 12	2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	4.5 B.2
	Grade 12	3. Analyze and evaluate the mathematical thinking and strategies of others.	4.5 B.3
Grade 12	4. Use the language of mathematics to express mathematical ideas precisely.	4.5 B.4	
Connections Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.	Grade 12	2. Recognize three-dimensional figures obtained through transformations of two-dimensional figures (e.g., cone as rotating an isosceles triangle about an altitude), using software as an aid to visualization.	4.2.12 B.2

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Connections Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Distance between two points	4.2.12 C.1.1
	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Midpoint and slope of a line segment	4.2.12 C.1.2
	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Finding the intersection of two lines	4.2.12 C.1.3
	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Lines with the same slope are parallel	4.2.12 C.1.4
	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Lines that are perpendicular have slopes whose product is -1	4.2.12 C.1.5
	Grade 12	1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	4.5 C.1
	Grade 12	2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	4.5 C.2
	Grade 12	3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	4.5 C.3
	Grade 12	4. Apply mathematics in practical situations and in other disciplines.	4.5 C.4
	Grade 12	5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	4.5 C.5

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<p>Connections</p> <p>Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.</p>	Grade 12	6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	4.5 C.6
<p>Data, Statistics, and Probability</p> <p>Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.</p>	Grade 12	1. Use surveys and sampling techniques to generate data and draw conclusions about large groups.	4.4.12 A.1.1
		Advantages/disadvantages of sample selection methods (e.g., convenience sampling, responses to survey, random sampling)	
	Grade 12	2. Evaluate the use of data in real-world contexts.	4.4.12 A.2.1
		Accuracy and reasonableness of conclusions drawn	
	Grade 12	2. Evaluate the use of data in real-world contexts.	4.4.12 A.2.2
		Correlation vs. causation	
	Grade 12	2. Evaluate the use of data in real-world contexts.	4.4.12 A.2.3
		Bias in conclusions drawn (e.g., influence of how data is displayed)	
	Grade 12	2. Evaluate the use of data in real-world contexts.	4.4.12 A.2.4
	Statistical claims based on sampling		
Grade 12	3. Design a statistical experiment, conduct the experiment, and interpret and communicate the outcome.	4.4.12 A.3	
Grade 12	4. Estimate or determine lines of best fit (or curves of best fit if appropriate) with technology, and use them to interpolate within the range of the data.	4.4.12 A.4	
Grade 12	6. Distinguish between randomized experiments and observational studies.	4.4.12 A.6	

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Data, Statistics, and Probability Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Grade 12	1. Calculate the expected value of a probability-based game, given the probabilities and payoffs of the various outcomes, and determine whether the game is fair.	4.4.12 B.1
	Grade 12	2. Use concepts and formulas of area to calculate geometric probabilities.	4.4.12 B.2
	Grade 12	3. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models, and solve problems using these models.	4.4.12 B.3
	Grade 12	4. Determine probabilities in complex situations.	4.4.12 B.4.1
	Conditional events		
	Grade 12	4. Determine probabilities in complex situations.	4.4.12 B.4.2
	Complementary events		
	Grade 12	4. Determine probabilities in complex situations.	4.4.12 B.4.3
	Dependent and independent events		
	Grade 12	5. Estimate probabilities and make predictions based on experimental and theoretical probabilities.	4.4.12 B.5
	Grade 12	6. Understand and use the "law of large numbers" (that experimental results tend to approach theoretical probabilities after a large number of trials).	4.4.12 B.6
	Grade 12	1. Calculate combinations with replacement (e.g., the number of possible ways of tossing a coin 5 times and getting 3 heads) and without replacement (e.g., number of possible delegations of 3 out of 23 students).	4.4.12 C.1
	Grade 12	2. Apply the multiplication rule of counting in complex situations, recognize the difference between situations with replacement and without replacement, and recognize the difference between ordered and unordered counting situations.	4.4.12 C.2
	Grade 12	3. Justify solutions to counting problems.	4.4.12 C.3

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Data, Statistics, and Probability Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Grade 12	4. Recognize and explain relationships involving combinations and Pascal's Triangle, and apply those methods to situations involving probability.	4.4.12 C.4
	Grade 12	1. Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems. Scheduling problems (e.g., when project meetings should be scheduled to avoid conflicts) using graph coloring	4.4.12 D.1.3
	Grade 12	1. Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems. Applications to science (e.g., who-eats-whom graphs, genetic trees, molecular structures)	4.4.12 D.1.4
	Grade 12	2. Explore strategies for making fair decisions. Combining individual preferences into a group decision (e.g., determining winner of an election or selection process)	4.4.12 D.2.1
	Grade 12	2. Explore strategies for making fair decisions. Determining how many Student Council representatives each class (9th, 10th, 11th, and 12th grade) gets when the classes have unequal sizes (apportionment)	4.4.12 D.2.2
	Geometry and Measurement Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Grade 12	1. Use geometric models to represent real-world situations and objects and to solve problems using those models (e.g., use Pythagorean Theorem to decide whether an object can fit through a doorway).
Grade 12		2. Draw perspective views of 3D objects on isometric dot paper, given 2D representations (e.g., nets or projective views).	4.2.12 A.2
Grade 12		3. Apply the properties of geometric shapes. Parallel lines - transversal, alternate interior angles, corresponding angles	4.2.12 A.3.1

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Geometry and Measurement Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Grade 12	3. Apply the properties of geometric shapes. Triangles a. Conditions for congruence	4.2.12 A.3.2.a
	Grade 12	3. Apply the properties of geometric shapes. Triangles b. Segment joining midpoints of two sides is parallel to and half the length of the third side	4.2.12 A.3.2.b
	Grade 12	3. Apply the properties of geometric shapes. Triangles c. Triangle Inequality	4.2.12 A.3.2.c
	Grade 12	3. Apply the properties of geometric shapes. Triangles d. Special right triangles	4.2.12 A.3.2.d
	Grade 12	3. Apply the properties of geometric shapes. Minimal conditions for a shape to be a special quadrilateral	4.2.12 A.3.3

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Geometry and Measurement Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Grade 12	3. Apply the properties of geometric shapes. Circles - arcs, central and inscribed angles, chords, tangents	4.2.12 A.3.4
	Grade 12	3. Apply the properties of geometric shapes. Self-similarity	4.2.12 A.3.5
	Grade 12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Verification or refutation of proposed proofs	4.2.12 A.4.1
	Grade 12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Simple proofs involving congruent triangles	4.2.12 A.4.2
	Grade 12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Counterexamples to incorrect conjectures	4.2.12 A.4.3
	Grade 12	5. Perform basic geometric constructions using a variety of methods (e.g., straightedge and compass, patty/tracing paper, or technology). Perpendicular bisector of a line segment	4.2.12 A.5.1
	Grade 12	5. Perform basic geometric constructions using a variety of methods (e.g., straightedge and compass, patty/tracing paper, or technology). Bisector of an angle	4.2.12 A.5.2

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<p>Geometry and Measurement</p> <p>Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.</p>	Grade 12	<p>5. Perform basic geometric constructions using a variety of methods (e.g., straightedge and compass, patty/tracing paper, or technology).</p> <p>Perpendicular or parallel lines</p>	4.2.12 A.5.3
	Grade 12	<p>1. Determine, describe, and draw the effect of a transformation, or a sequence of transformations, on a geometric or algebraic representation, and, conversely, determine whether and how one representation can be transformed to another by a transformation or a sequence of transformations.</p>	4.2.12 B.1
	Grade 12	<p>2. Recognize three-dimensional figures obtained through transformations of two-dimensional figures (e.g., cone as rotating an isosceles triangle about an altitude), using software as an aid to visualization.</p>	4.2.12 B.2
	Grade 12	<p>3. Determine whether two or more given shapes can be used to generate a tessellation.</p>	4.2.12 B.3
	Grade 12	<p>4. Generate and analyze iterative geometric patterns.</p> <p>Fractals (e.g., Sierpinski's Triangle)</p>	4.2.12 B.4.1
	Grade 12	<p>4. Generate and analyze iterative geometric patterns.</p> <p>Patterns in areas and perimeters of self-similar figures</p>	4.2.12 B.4.2
	Grade 12	<p>4. Generate and analyze iterative geometric patterns.</p> <p>Outcome of extending iterative process indefinitely</p>	4.2.12 B.4.3
	Grade 12	<p>1. Use coordinate geometry to represent and verify properties of lines and line segments.</p> <p>Distance between two points</p>	4.2.12 C.1.1

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Geometry and Measurement Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Midpoint and slope of a line segment	4.2.12 C.1.2
	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Finding the intersection of two lines	4.2.12 C.1.3
	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Lines with the same slope are parallel	4.2.12 C.1.4
	Grade 12	1. Use coordinate geometry to represent and verify properties of lines and line segments. Lines that are perpendicular have slopes whose product is -1	4.2.12 C.1.5
	Grade 12	3. Find an equation of a circle given its center and radius and, given an equation of a circle in standard form, find its center and radius.	4.2.12 C.3
	Grade 12	1. Understand and use the concept of significant digits.	4.2.12 D.1
	Grade 12	2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation. Degree of accuracy of a given measurement tool	4.2.12 D.2.1
	Grade 12	2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation. Finding the interval in which a computed measure (e.g., area or volume) lies, given the degree of precision of linear measurements	4.2.12 D.2.2

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Geometry and Measurement Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Grade 12	1. Use techniques of indirect measurement to represent and solve problems. Similar triangles	4.2.12 E.1.1
	Grade 12	1. Use techniques of indirect measurement to represent and solve problems. Pythagorean theorem	4.2.12 E.1.2
	Grade 12	2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures. Approximation of area using grids of different sizes	4.2.12 E.2.1
	Grade 12	2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures. Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets	4.2.12 E.2.2
	Grade 12	2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures. Estimation of area, perimeter, volume, and surface area	4.2.12 E.2.3
Number and Operations Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations. Perform computations correctly.	Grade 12	1. Extend understanding of the number system to all real numbers.	4.1.12 A.1
	Grade 12	2. Compare and order rational and irrational numbers.	4.1.12 A.2
	Grade 12	3. Develop conjectures and informal proofs of properties of number systems and sets of numbers.	4.1.12 A.3
	Grade 12	1. Extend understanding and use of operations to real numbers and algebraic procedures.	4.1.12 B.1

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Number and Operations Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations. Perform computations correctly.	Grade 12	2. Develop, apply, and explain methods for solving problems involving rational and negative exponents.	4.1.12 B.2
	Grade 12	4. Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers.	4.1.12 B.4
	Grade 12	1. Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.	4.1.12 C.1
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	4. Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers.	4.1.12 B.4
	Grade 12	1. Use geometric models to represent real-world situations and objects and to solve problems using those models (e.g., use Pythagorean Theorem to decide whether an object can fit through a doorway).	4.2.12 A.1
	Grade 12	2. Draw perspective views of 3D objects on isometric dot paper, given 2D representations (e.g., nets or projective views).	4.2.12 A.2
	Grade 12	3. Apply the properties of geometric shapes.	4.2.12 A.3.1
	Grade 12	Parallel lines - transversal, alternate interior angles, corresponding angles	4.2.12 A.3.2.a
	Grade 12	3. Apply the properties of geometric shapes.	4.2.12 A.3.2.a
	Grade 12	Triangles	4.2.12 A.3.2.b
	Grade 12	a. Conditions for congruence	4.2.12 A.3.2.b
Grade 12	3. Apply the properties of geometric shapes.	4.2.12 A.3.2.b	
Grade 12	Triangles	4.2.12 A.3.2.b	
Grade 12	b. Segment joining midpoints of two sides is parallel to and half the length of the third side	4.2.12 A.3.2.b	

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Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	3. Apply the properties of geometric shapes. Triangles c. Triangle Inequality	4.2.12 A.3.2.c
	Grade 12	3. Apply the properties of geometric shapes. Triangles d. Special right triangles	4.2.12 A.3.2.d
	Grade 12	3. Apply the properties of geometric shapes. Circles - arcs, central and inscribed angles, chords, tangents	4.2.12 A.3.4
	Grade 12	3. Apply the properties of geometric shapes. Self-similarity	4.2.12 A.3.5
	Grade 12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Verification or refutation of proposed proofs	4.2.12 A.4.1
	Grade 12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Simple proofs involving congruent triangles	4.2.12 A.4.2
	Grade 12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Counterexamples to incorrect conjectures	4.2.12 A.4.3

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Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	5. Perform basic geometric constructions using a variety of methods (e.g., straightedge and compass, patty/tracing paper, or technology). Perpendicular bisector of a line segment	4.2.12 A.5.1
	Grade 12	5. Perform basic geometric constructions using a variety of methods (e.g., straightedge and compass, patty/tracing paper, or technology). Bisector of an angle	4.2.12 A.5.2
	Grade 12	5. Perform basic geometric constructions using a variety of methods (e.g., straightedge and compass, patty/tracing paper, or technology). Perpendicular or parallel lines	4.2.12 A.5.3
	Grade 12	4. Generate and analyze iterative geometric patterns. Fractals (e.g., Sierpinski's Triangle)	4.2.12 B.4.1
	Grade 12	4. Generate and analyze iterative geometric patterns. Patterns in areas and perimeters of self-similar figures	4.2.12 B.4.2
	Grade 12	4. Generate and analyze iterative geometric patterns. Outcome of extending iterative process indefinitely	4.2.12 B.4.3
	Grade 12	3. Find an equation of a circle given its center and radius and, given an equation of a circle in standard form, find its center and radius.	4.2.12 C.3
	Grade 12	2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation. Degree of accuracy of a given measurement tool	4.2.12 D.2.1

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Skill Category and Description of Skills	Course/ Level	Standard	Standard ID
<p>Problem Solving</p> <p>Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.</p>	Grade 12	<p>2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.</p> <p>Finding the interval in which a computed measure (e.g., area or volume) lies, given the degree of precision of linear measurements</p>	4.2.12 D.2.2
	Grade 12	<p>1. Use techniques of indirect measurement to represent and solve problems.</p> <p>Similar triangles</p>	4.2.12 E.1.1
	Grade 12	<p>1. Use techniques of indirect measurement to represent and solve problems.</p> <p>Pythagorean theorem</p>	4.2.12 E.1.2
	Grade 12	<p>2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <p>Approximation of area using grids of different sizes</p>	4.2.12 E.2.1
	Grade 12	<p>2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <p>Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets</p>	4.2.12 E.2.2
	Grade 12	<p>2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <p>Estimation of area, perimeter, volume, and surface area</p>	4.2.12 E.2.3

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	1. Use models and algebraic formulas to represent and analyze sequences and series. Explicit formulas for n th terms	4.3.12 A.1.1
	Grade 12	1. Use models and algebraic formulas to represent and analyze sequences and series. Sums of finite arithmetic series	4.3.12 A.1.2
	Grade 12	1. Use models and algebraic formulas to represent and analyze sequences and series. Sums of finite and infinite geometric series	4.3.12 A.1.3
	Grade 12	3. Use inductive reasoning to form generalizations.	4.3.12 A.3
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Slope of a line	4.3.12 B.2.1
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Domain and range	4.3.12 B.2.2
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Intercepts	4.3.12 B.2.3
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Continuity	4.3.12 B.2.4

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Maximum/minimum	4.3.12 B.2.5
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Estimating roots of equations	4.3.12 B.2.6
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Solutions of systems of equations	4.3.12 B.2.7
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Solutions of systems of linear inequalities using graphing techniques	4.3.12 B.2.8
	Grade 12	2. Analyze and explain the general properties and behavior of functions or relations, using algebraic and graphing techniques. Rates of change	4.3.12 B.2.9
	Grade 12	3. Understand and perform transformations on commonly-used functions. Translations, reflections, dilations	4.3.12 B.3.1
	Grade 12	3. Understand and perform transformations on commonly-used functions. Effects on linear and quadratic graphs of parameter changes in equations	4.3.12 B.3.2

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	3. Understand and perform transformations on commonly-used functions. Using graphing calculators or computers for more complex functions	4.3.12 B.3.3
	Grade 12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Linear vs. non-linear	4.3.12 B.4.1
	Grade 12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Symmetry	4.3.12 B.4.2
	Grade 12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Increasing/decreasing on an interval	4.3.12 B.4.3
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Linear, quadratic, exponential, periodic (sine and cosine), and step functions (e.g., price of mailing a first-class letter over the past 200 years)	4.3.12 C.1.1
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Direct and inverse variation	4.3.12 C.1.2
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Absolute value	4.3.12 C.1.3

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Expressions, equations and inequalities	4.3.12 C.1.4
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Same function can model variety of phenomena	4.3.12 C.1.5
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Growth/decay and change in the natural world	4.3.12 C.1.6
	Grade 12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Applications in mathematics, biology, and economics (including compound interest)	4.3.12 C.1.7
	Grade 12	1. Evaluate and simplify expressions. Add and subtract polynomials	4.3.12 D.1.1
	Grade 12	1. Evaluate and simplify expressions. Multiply a polynomial by a monomial or binomial	4.3.12 D.1.2
	Grade 12	1. Evaluate and simplify expressions. Divide a polynomial by a monomial	4.3.12 D.1.3

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	1. Evaluate and simplify expressions. Perform simple operations with rational expressions	4.3.12 D.1.4
	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. Linear equations and inequalities - algebraically	4.3.12 D.2.1
	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. Quadratic equations - factoring (including trinomials when the coefficient of x^2 is 1) and using the quadratic formula	4.3.12 D.2.2
	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. Literal equations	4.3.12 D.2.3
	Grade 12	2. Select and use appropriate methods to solve equations and inequalities. All types of equations and inequalities using graphing, computer, and graphing calculator techniques	4.3.12 D.2.4
	Grade 12	3. Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.	4.3.12 D.3
	Grade 12	1. Use surveys and sampling techniques to generate data and draw conclusions about large groups. Advantages/disadvantages of sample selection methods (e.g., convenience sampling, responses to survey, random sampling)	4.4.12 A.1.1

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	2. Evaluate the use of data in real-world contexts. Accuracy and reasonableness of conclusions drawn	4.4.12 A.2.1
	Grade 12	2. Evaluate the use of data in real-world contexts. Correlation vs. causation	4.4.12 A.2.2
	Grade 12	2. Evaluate the use of data in real-world contexts. Bias in conclusions drawn (e.g., influence of how data is displayed)	4.4.12 A.2.3
	Grade 12	2. Evaluate the use of data in real-world contexts. Statistical claims based on sampling	4.4.12 A.2.4
	Grade 12	4. Estimate or determine lines of best fit (or curves of best fit if appropriate) with technology, and use them to interpolate within the range of the data.	4.4.12 A.4
	Grade 12	1. Calculate the expected value of a probability-based game, given the probabilities and payoffs of the various outcomes, and determine whether the game is fair.	4.4.12 B.1
	Grade 12	2. Use concepts and formulas of area to calculate geometric probabilities.	4.4.12 B.2
	Grade 12	3. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models, and solve problems using these models.	4.4.12 B.3
	Grade 12	4. Determine probabilities in complex situations. Conditional events	4.4.12 B.4.1
	Grade 12	4. Determine probabilities in complex situations. Complementary events	4.4.12 B.4.2

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	4. Determine probabilities in complex situations. Dependent and independent events	4.4.12 B.4.3
	Grade 12	1. Calculate combinations with replacement (e.g., the number of possible ways of tossing a coin 5 times and getting 3 heads) and without replacement (e.g., number of possible delegations of 3 out of 23 students).	4.4.12 C.1
	Grade 12	1. Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems. Scheduling problems (e.g., when project meetings should be scheduled to avoid conflicts) using graph coloring	4.4.12 D.1.3
	Grade 12	1. Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems. Applications to science (e.g., who-eats-whom graphs, genetic trees, molecular structures)	4.4.12 D.1.4
	Grade 12	2. Explore strategies for making fair decisions. Combining individual preferences into a group decision (e.g., determining winner of an election or selection process)	4.4.12 D.2.1
	Grade 12	2. Explore strategies for making fair decisions. Determining how many Student Council representatives each class (9th, 10th, 11th, and 12th grade) gets when the classes have unequal sizes (apportionment)	4.4.12 D.2.2
	Grade 12	1. Learn mathematics through problem solving, inquiry, and discovery.	4.5 A.1
	Grade 12	2. Solve problems that arise in mathematics and in other contexts. Open-ended problems	4.5 A.2.1

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grade 12	2. Solve problems that arise in mathematics and in other contexts. Non-routine problems	4.5 A.2.2
	Grade 12	2. Solve problems that arise in mathematics and in other contexts. Problems with multiple solutions	4.5 A.2.3
	Grade 12	2. Solve problems that arise in mathematics and in other contexts. Problems that can be solved in several ways	4.5 A.2.4
	Grade 12	3. Select and apply a variety of appropriate problem-solving strategies (e.g., "try a simpler problem" or "make a diagram") to solve problems.	4.5 A.3
	Grade 12	4. Pose problems of various types and levels of difficulty.	4.5 A.4
	Grade 12	5. Monitor their progress and reflect on the process of their problem solving activity.	4.5 A.5
	Grade 12	6. Distinguish relevant from irrelevant information, and identify missing information.	4.5 A.6
	Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grade 12	2. Compare and order rational and irrational numbers.
Grade 12		3. Develop conjectures and informal proofs of properties of number systems and sets of numbers.	4.1.12 A.3
Grade 12		2. Develop, apply, and explain methods for solving problems involving rational and negative exponents.	4.1.12 B.2
Grade 12		1. Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.	4.1.12 C.1
Grade 12		3. Apply the properties of geometric shapes. Minimal conditions for a shape to be a special quadrilateral	4.2.12 A.3.3

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT	New Jersey Math: Core Curriculum Content Standards 2008		
Skill Category and Description of Skills	Course/ Level	Standard	Standard ID
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grade 12	1. Determine, describe, and draw the effect of a transformation, or a sequence of transformations, on a geometric or algebraic representation, and, conversely, determine whether and how one representation can be transformed to another by a transformation or a sequence of transformations.	4.2.12 B.1
	Grade 12	3. Determine whether two or more given shapes can be used to generate a tessellation.	4.2.12 B.3
	Grade 12	1. Understand and use the concept of significant digits.	4.2.12 D.1
	Grade 12	2. Develop an informal notion of limit.	4.3.12 A.2
	Grade 12	1. Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.	4.3.12 B.1
	Grade 12	2. Analyze and describe how a change in an independent variable leads to change in a dependent one.	4.3.12 C.2
	Grade 12	1. Evaluate and simplify expressions. Evaluate polynomial and rational expressions	4.3.12 D.1.5
	Grade 12	5. Estimate probabilities and make predictions based on experimental and theoretical probabilities.	4.4.12 B.5
	Grade 12	6. Understand and use the "law of large numbers" (that experimental results tend to approach theoretical probabilities after a large number of trials).	4.4.12 B.6
	Grade 12	2. Apply the multiplication rule of counting in complex situations, recognize the difference between situations with replacement and without replacement, and recognize the difference between ordered and unordered counting situations.	4.4.12 C.2
	Grade 12	3. Justify solutions to counting problems.	4.4.12 C.3
	Grade 12	4. Recognize and explain relationships involving combinations and Pascal's Triangle, and apply those methods to situations involving probability.	4.4.12 C.4
	Grade 12	1. Recognize that mathematical facts, procedures, and claims must be justified.	4.5 D.1
	Grade 12	2. Use reasoning to support their mathematical conclusions and problem solutions.	4.5 D.2

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2008		
	Course/ Level	Standard	Standard ID
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grade 12	3. Select and use various types of reasoning and methods of proof.	4.5 D.3
	Grade 12	4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	4.5 D.4
	Grade 12	5. Make and investigate mathematical conjectures. Counterexamples as a means of disproving conjectures	4.5 D.5.1
	Grade 12	5. Make and investigate mathematical conjectures. Verifying conjectures using informal reasoning or proofs.	4.5 D.5.2
	Grade 12	6. Evaluate examples of mathematical reasoning and determine whether they are valid.	4.5 D.6
	Representation Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Grade 12	3. Convert recursive formulas to linear or exponential functions (e.g., Tower of Hanoi and doubling).
Grade 12		1. Create and use representations to organize, record, and communicate mathematical ideas. Concrete representations (e.g., base-ten blocks or algebra tiles)	4.5 E.1.1
Grade 12		1. Create and use representations to organize, record, and communicate mathematical ideas. Pictorial representations (e.g., diagrams, charts, or tables)	4.5 E.1.2
Grade 12		1. Create and use representations to organize, record, and communicate mathematical ideas. Symbolic representations (e.g., a formula)	4.5 E.1.3

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT	New Jersey Math: Core Curriculum Content Standards 2008		
Skill Category and Description of Skills	Course/ Level	Standard	Standard ID
<p>Representation</p> <p>Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.</p>	Grade 12	<p>1. Create and use representations to organize, record, and communicate mathematical ideas.</p> <p>Graphical representations (e.g., a line graph)</p>	4.5 E.1.4
	Grade 12	2. Select, apply, and translate among mathematical representations to solve problems.	4.5 E.2
	Grade 12	3. Use representations to model and interpret physical, social, and mathematical phenomena.	4.5 E.3

PSAT/NMSQT Skills Insight™ Alignment to State Standards

Executive Summary, July 2010

Purpose

PSAT/NMSQT *Skills Insight*™ is a free online tool designed to help students and educators gain a better understanding of how PSAT/NMSQT® scores relate to specific academic skills. It provides a description of the academic skills that are typical of students scoring at each score band, suggestions for improvement, and practice test questions. Learn more by visiting www.collegeboard.com/psatskills.

The information provided by PSAT/NMSQT *Skills Insight* is organized by skill category. There are five skill categories for the critical reading section, nine for the mathematics section (4 content skill categories; 5 process skill categories), and 5 for the writing skills section. This report shows the alignment between state standards in English Language Arts and Mathematics and the content and skills measured by the PSAT/NMSQT.

Using Alignment Results with PSAT/NMSQT Reports

Schools and districts that administer the PSAT/NMSQT have access to the *Summary of Answers and Skills* (SOAS) report¹. SOAS reports summarize performance on test sections, skill categories, and individual test questions, and compare local results to the state or nation. Using SOAS and the alignment information provided in this report, schools and districts can develop remediation strategies to help students improve their college readiness skills, future SAT scores, and performance on state assessments.

Mathematics: Alignment Approach and Findings

- There are nine Skills Categories in Mathematics, representing both content and process skills: *Number and Operations; Algebra and Functions; Geometry and Measurement; Data, Statistics and Probability; Problem Solving; Representation; Reasoning; Connections and Communication*.
- Only standards for grades 9-12 were considered for these alignments. Within grades 9-12, the areas with the greatest concentration of alignments are the Number and Operations, Algebra and Geometry strands of the state standards. In most cases, Precalculus and Trigonometry were excluded from the alignment study.
- The organization and hierarchy of standards varies on a state-by-state basis. During the alignment process, the College Board aligned the PSAT/NMSQT skills to the most specific level of the state's standards.
- States often integrate process and content standards. In such cases, the state standard received an alignment to both a process skill category and a content skill category.
- Generally, there is strong correspondence between the PSAT/NMSQT Skills Categories in Mathematics and state standards. Coverage of the Skills Categories across a state standards document is dependent upon the specific state standards and on the degree of specificity of language employed within the standards.
- The PSAT/NMSQT is administered to students in grades 10 and 11; consequently, the strongest areas of alignment are in the content categories of *Number and Operations, Algebra and Functions* and *Geometry and Measurement* and in the process categories of *Problem Solving, Reasoning* and *Representations*. Considering the design and purpose of the PSAT/NMSQT, extensive alignments in upper levels of high school mathematics standards, including Trigonometry, are not intended or expected.

¹ Using the access code printed on the PSAT/NMSQT *Roster of Student Scores and Plans*, SOAS reports can be downloaded from www.collegeboard.com/reports beginning in the first week of January.

- The College Board content specialists who conducted the alignments have a deep understanding of the PSAT/NMSQT test specifications. Therefore, although multiple Skills Categories might link to a particular standard, these alignments display only the strongest and most appropriate matches.

English Language Arts: Alignment Approach and Findings

- Reading and Writing each have five PSAT/NMSQT Skills Categories. In Reading, the categories are *Determining the Meaning of Words*, *Author’s Craft*, *Reasoning and Inferencing*, *Organization and Ideas* and *Understanding Literary Elements*. In Writing, the categories are *Manage Word Choice and Grammatical Relationships Between Words*, *Manage Grammatical Structures Used to Modify or Compare*, *Manage Phrases and Clauses in a Sentence*; *Recognize Correctly Formed Sentences* and *Manage Order and Relationships of Sentences and Paragraphs*.
- The PSAT/NMSQT is administered to students in grades 10 and 11, and the College Board targeted the English Language Arts alignments at these specific grade levels. In states where the standards are organized by grade band (grades 9-10, 11-12) or by one high school band (grades 9-12), the College Board aligned to all high school grade levels.
- Given the purpose and design of the PSAT/NMSQT, the English Language Arts alignment is focused on the areas of reading and writing and does not include state standards in speaking, listening, or media literacy. Additionally, these alignments excluded genre-specific state standards (such as those related to American, British, or World literature), although the essential PSAT/NMSQT skills in Reading can be used to support instruction in literature.
- The organization and hierarchy of standards varies on a state-by-state basis. During the alignment process, the College Board aligned the PSAT/NMSQT skills to the most specific level of the state’s standards. Coverage of the Skills Categories across a state standards document is dependent upon the specific state standards and on the degree of specificity of language employed within the standards.
- In Writing, generally there is strong correspondence between the PSAT/NMSQT Skills Categories and state standards that focus on grammar, usage, language conventions, and the role of editing and revising in writing.
- In Reading, there is strong correspondence between the PSAT/NMSQT Skills Categories and state standards in the essential areas of vocabulary development (determine the meaning of unfamiliar words or of words with multiple meanings by understanding context and by analyzing roots, prefixes, and suffixes) and reading comprehension (determine the main idea and supporting details; understand the organization of passages; analyze the various elements of an author’s craft, including purpose, perspective, word choice, and use of rhetorical and literary devices and understand literary elements such as plot, characterization, and setting).

Summary

In summary, the PSAT/NMSQT Skills Categories correspond well to state standards. Educators can use these alignments to connect the PSAT/NMSQT to their local curricula and state standards to monitor student learning and to build a coherent instructional plan for their students.